28

DECIMAL PLACE VALUES*

0.1	Indicates 1/10 (one tenth of an inch or millimeter)
0.010	Indicates 1/100 (one one-hundreth of an inch or millimeter)
0.001	Indicates 1/1,000 (one one-thousandth of an inch or millimeter)

*This chart represents the values of figures placed to the right of the decimal point. Use it when reading decimals from one-tenth to one one-thousandth of an inch or millimeter. It is not a conversion chart (for example: 0.001 in. is not equal to 0.001 mm).

though not as precise as a micrometer, they allow reasonable precision, typically to within 0.05 mm (0.001 in.). Most calipers have a range up to 150 mm (6 in.).

Calipers are available in dial, vernier or digital versions. Dial calipers have a dial readout that is convenient to read. Vernier calipers have marked scales that must be compared to determine the measurement. The digital caliper uses an LCD display to show the measurement.

Properly maintain the measuring surfaces of the caliper. There must not be any dirt or burrs between the tool and the object being measured. Never force the caliper closed around an object. Close the caliper around the highest point so it can be removed with a slight drag. Some calipers require calibration. Always refer to the manufacturer's instructions when using a new or unfamiliar caliper.

Figure 27 shows a measurement taken with a vernier caliper. Refer to the metric scale and note that the fixed scale is graduated in centimeters, which is indicated by the whole numbers 1, 2, 3 and so on. Each centimeter is then divided into millimeters, which are indicated by the small line between the whole numbers (1 centimeter equals 10 millimeters). The movable scale is marked in increments of 0.05 (hundredths) mm. The value of a measurement equals the reading on the fixed scale plus the reading on the movable scale.

To determine the reading on the fixed scale, look for the line on the fixed scale immediately to the left of the 0-line on the movable scale. In **Figure 27**, the fixed scale reading is 1 centimeter (or 10 millimeters).

29

To determine the reading on the movable scale, note the one line on the movable scale that precisely aligns with a line on the fixed scale. Look closely. A number of lines will seem close, but only one lines up precisely with a line on the fixed scale. In **Figure 27**, the movable scale reading is 0.50 mm.

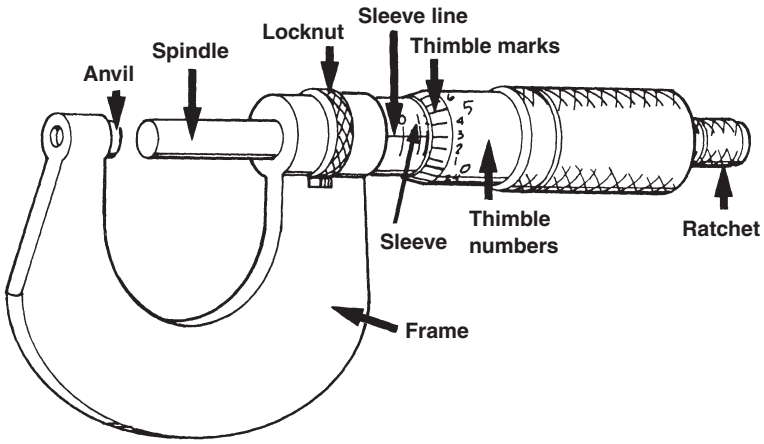
To calculate the measurement, add the fixed scale reading (10 mm) to the movable scale reading (0.50 mm) for a value of 10.50 mm.

Micrometers

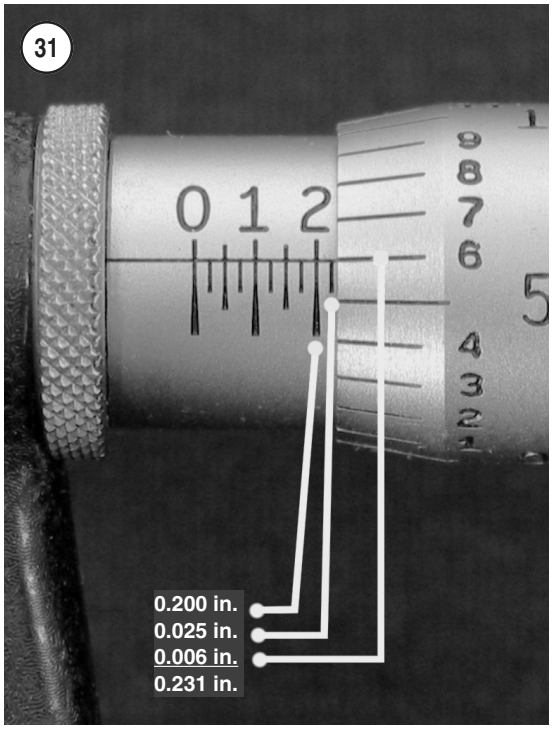
A micrometer is an instrument designed for linear measurement using the decimal divisions of the inch or meter (**Figure 28**). While there are many types and styles of micrometers, most of the procedures in this manual call for an outside micrometer. The outside micrometer is used to measure the outside diameter of cylindrical forms and the thickness of materials.

A micrometer's size indicates the minimum and maximum size of a part that it can measure. The

30



31



usual sizes (**Figure 29**) are 0-1 in. (0-25 mm), 1-2 in. (25-50 mm), 2-3 in. (50-75 mm) and 3-4 in. (75-100 mm).

Micrometers that cover a wider range of measurement are available. These use a large frame with interchangeable anvils of various lengths. This type of micrometer offers a cost savings; however, its overall size may make it less convenient.

Reading a Micrometer

When reading a micrometer, numbers are taken from different scales and added together. The following sections describe how to read the measurements of various types of outside micrometers.

For accurate results, properly maintain the measuring surfaces of the micrometer. There must not be any dirt or burrs between the tool and the measured object. Never force the micrometer closed around an object. Close the micrometer around the highest point so it can be removed with a slight drag. **Figure 30** shows the markings and parts of a standard inch micrometer. Be familiar with these terms before using a micrometer in the following sections.

Standard inch micrometer

The standard inch micrometer is accurate to one-thousandth of an inch or 0.001. The sleeve is marked in 0.025 in. increments. Every fourth sleeve mark is numbered 1, 2, 3, 4, 5, 6, 7, 8, 9. These numbers indicate 0.100, 0.200, 0.300, and so on.

The tapered end of the thimble has 25 lines marked around it. Each mark equals 0.001 in. One complete turn of the thimble aligns its zero mark with the first mark on the sleeve or 0.025 in.

When reading a standard inch micrometer, perform the following steps while referring to **Figure 31**.

1. Read the sleeve and find the largest number visible. Each sleeve number equals 0.100 in.

2. Count the number of lines between the numbered sleeve mark and the edge of the thimble. Each sleeve mark equals 0.025 in.

3. Read the thimble mark that aligns with the sleeve line. Each thimble mark equals 0.001 in.

NOTE
If a thimble mark does not align exactly with the sleeve line, estimate the amount between the lines. For accurate readings in ten-thousandths of an inch (0.0001 in.), use a vernier inch micrometer.

4. Add the readings from Steps 1-3.

Metric micrometer

The standard metric micrometer is accurate to one one-hundredth of a millimeter (0.01-mm). The sleeve line is graduated in millimeter and half millimeter increments. The marks on the upper half of the sleeve line equal 1.00 mm. Every fifth mark above the sleeve line is identified with a number. The number sequence depends on the size of the micrometer. A 0-25 mm micrometer, for example, has sleeve marks numbered 0 through 25 in 5 mm increments. This numbering sequence continues with larger micrometers. On all metric micrometers, each mark on the lower half of the sleeve equals 0.50 mm.

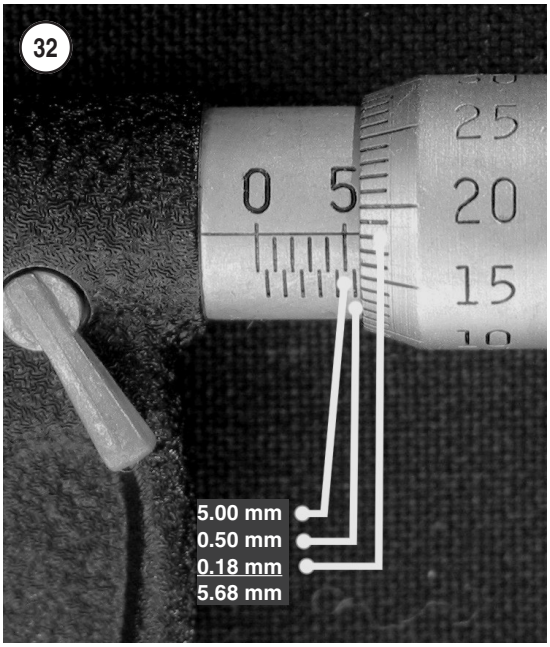
The tapered end of the thimble has fifty lines marked around it. Each mark equals 0.01 mm. One complete turn of the thimble aligns its 0 mark with the first line on the lower half of the sleeve line or 0.50 mm.

When reading a metric micrometer, add the number of millimeters and half-millimeters on the sleeve line to the hundredths of a millimeter shown on the thimble. Perform the following steps while referring to **Figure 32**.

1. Read the upper half of the sleeve line and count the number of lines visible. Each upper line equals 1 mm.

2. See if the half-millimeter line is visible on the lower sleeve line. If so, add 0.50 to the reading in Step 1.

3. Read the thimble mark that aligns with the sleeve line. Each thimble mark equals 0.01 mm.



NOTE
If a thimble mark does not align exactly with the sleeve line, estimate the amount between the lines. For accurate readings to two-thousandths of a millimeter (0.002 mm), use a metric vernier micrometer.

4. Add the readings from Steps 1-3.

Micrometer Adjustment

Before using a micrometer, check its adjustment as follows:

1. Clean the anvil and spindle faces.

2A. To check a 0-1 in. or 0-25 mm micrometer:

34

35

a. Turn the thimble until the spindle contacts the anvil. If the micrometer has a ratchet stop, use it to ensure that the proper amount of pressure is applied.

b. The adjustment is correct if the 0 mark on the thimble aligns exactly with the 0 mark on the sleeve line. If the marks do not align, the micrometer is out of adjustment.

c. Follow the manufacturer's instructions to adjust the micrometer.

2B. To check a micrometer larger than 1 in. or 25 mm, use the standard gauge supplied by the manufacturer. A standard gauge is a steel block, disc or rod that is machined to an exact size.

a. Place the standard gauge between the spindle and anvil, and measure its outside diameter or length. If the micrometer has a ratchet stop, use it to ensure that the proper amount of pressure is applied.

b. The adjustment is correct if the 0 mark on the thimble aligns exactly with the 0 mark on the sleeve line. If the marks do not align, the micrometer is out of adjustment.

c. Follow the manufacturer's instructions to adjust the micrometer.

Micrometer Care

Micrometers are precision instruments. They must be used and maintained with great care. Note the following:

1. Store micrometers in protective cases or separate padded drawers in a toolbox.
2. Make sure the spindle and anvil faces do not contact each other or another objectw hile in storage. If they do, temperature changes and corrosion may damage the contact faces.
3. Do not clean a micrometer with compressed air. Dirt forced into the tool will cause wear.
4. Lubricate micrometers with WD-40 to prevent corrosion.

Telescoping and Small Bore Gauges

Use telescoping gauges (**Figure 33**) and small bore gauges (**Figure 34**) to measure bores. Neither gauge has a scale for direct readings. An outside micrometer must be used to determine the reading.

To use a telescoping gauge, select the correct size gauge for the bore. Compress the movable post and carefully insert the gauge into the bore. Carefully move the gauge in the bore to make sure it is centered. Tighten the knurled end of the gauge to hold the movable post in position. Remove the gauge, and measure the length of the posts with a micrometer. Telescoping gauges are typically used to measure cylinder bores.

To use a small-bore gauge, select the correct size gauge for the bore. Carefully insert the gauge into the bore. Tighten the knurled end of the gauge to carefully expand the gauge fingers to the limit within the bore. Do not overtighten the gauge, as there is no built-in release. Excessive tightening can damage the bore surface and damage the tool. Remove the gauge and measure the outside dimension (**Figure 35**). Small bore gauges are typically used to measure valve guides.

Dial Indicator

A dial indicator (A, **Figure 36**) is a gauge with a dial face and needle used to measure variations in dimensions and movements. Measuring brake rotor runout is a typical use for a dial indicator.

Copyright of Honda TRX350 RANCHER, 2000-2006 is the property of Penton Media, Inc. ("Clymer") and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.